INDEX

Transactions of American Society for Metals

Volume LIX, 1966

Index of Authors

A

Amateau, M. F. 920–929
Anderson, Karl E. 352–355
Ansell, G. S. 631–643, 891–898
Aqua, E. N. 367–373
Armijo, J. S. 544–556
Aust, K. T. 544–556

B

Backofen, Walter A. 755–768
Banerjee, B. R. 128–131
Banerjee, S. 1010–1014
Barrett, Craig, R. 3–15
Barton, C. J. ..... 580 (A)*
Birkle, A. J. 981–990
Blackburn, M. J. 694–708, 877–889
Blomquist, Robert A. 352–355
Bourgette, D. T. 324–339
Bradford, S. A. 645–651
Bressanelli, J. P. 223–239
Buehler, W. J. 350–352
Burrier, H. I., Jr. 920–929
Busch, R. ..... 575 (A)
Butler, J. R. 427–438

C

Castleman, L. S. 185–194
Chandhok, V. K. 288–301
Chang, W. H. 457–467
Chen, F. P. H. ..... 578–579 (A)
Chilton, J. M. ..... 580 (A)
Churay, T. P. ..... 577 (A)
Cline, H. E. 132–136
Clough, W. R. 785–803
Cohen, Morris ..... 574 (A), 575–576 (A)
Colgate, J. D. 302–314
Colton, R. M. 302–314
Conrad, H. 171–184
Corrie, J. D. ..... 582–583 (A), 665–671
Crimmins, P. P. ..... 584 (A)
Crooker, T. W. 195–207

D

Danesi, W. P. 505–516
Deitch, Michael 85–93
Detert, K. 262–276
Donachie, M. J. 505–516
Dorn, J. E. 930–944

E

Ebert, L. J. 920–929
Edelman, R. E. 250–261
Ellison, E. G. 744–754, 1002–1004
Escalante, Edward ..... 581 (A)

F

Fine, Morris E. 468–478

G

Gerberich, W. W. ..... 575 (A), 584 (A), 899–908
Gilman, John J. 597–629
Goggin, W. R. 315–323
Goode, R. J. 195–207
Goodenow, R. H. 804–824
Goodwin, J. G. 384–397
Gorman, L. A. 491–504
Grange, R. A. 26–48
Grant, Nicholas J. ..... 578 (A)
Greenhut, V. 709–743
Guy, A. G. 517–534

H

Hahn, G. T. ..... 16–25, 572–573 (A), 909–919, 962–980
Hammad, F. H. 94–104
Harrington, R. H. ..... 576–577 (A)
Harris, B. 744–754
Hartbower, C. E. ..... 584 (A)
Hauser, J. J. 128–131
Heine, R. W. 162–170
Hepfer, W. D. 345–349
Hirschhorn, J. S. 208–222
Hirth, J. P. 288–301
Hobson, D. O. 568–570

Complied by Mrs. D. Motsch, East Cleveland, Ohio.

* (A) = Abstract only.

Hoffman, David W. ..... 574 (A)
Holmes, J. J. 557–567
Holt, David L. 755–768
Honeycutt, C. R. 113–127
Hornbecker, M. F. 155–161
Hyatt, Michael V. 342–344

I

Irani, J. J. .....340–342, 573–574 (A)

J

Jacobs, A. J. .....585–586 (A)
Johnson, H. H. .....581–582 (A)
Johnson, Irving 352–355
Jolley, W. 439–456
Judy, R. W., Jr. 195–207

K

Kalish, D. .....575–576 (A)
Kappelt, G. G. .....586–587 (A)
Kammerer, H. G. .....586–587 (A)
Kasak, A. 288–301
Kear, B. H. 155–161
Kim, H. S. 631–643
King, E. J. .....586–587 (A)
Kottcamp, E. H. 439–456

L

Lange, E. A. 195–207
Lenel, F. V. 208–222, 891–898
Leroy, V. 517–534
Leslie, W. C. .....577 (A), 998–1001
Leverant, G. R. 891–898
Lindemer, T. B. 517–534
London, R. V. 250–261
Logan, Hugh L. .....581 (A), 586 (A)
Loper, Carl R., Jr. 1010–1014
Lund, J. A. 673–684

M

McCall, J. J. 991–993
McCoy, H. E. 277–287, 324–339, 568–570
McGowan, Martin T. .....584–585 (A)
McMillan, J. Corey 342–344
Marcus, Harris 467–478
Markus, H. 250–261, 665–671
Mihalisin, J. R. 60–70
Moberly, J. W. 315–323
Morey, R. E. 195–207
Morris, J. G. 1006–1009
Morrison, W. B. 825–846
Moskowitz, A. 223–239
Mukherjee, A. K. 930–944
Murphy, Richard J. ..... 578 (A)
Nakada, Y. ..... 577 (A)
Nix, William D. 3–15, 94–104

N

Numakura, K. 653–664

O

Oelschlägel, Dietrich 143–154, 685–693
Oldfield, W. 945–961
Olson, J. H. 769–783
Ono, Kanji ..... 573 (A)
Orava, R. N. 171–184

P

Park, John J. ..... 579 (A)
Parker, E. R. ..... 575 (A)
Pasquine, D. L. 769–783
Patterson, William R. 71–84
Pellissier, G. E. 981–990
Phelps, W. C., Jr. 105–112
Piearcey, B. J. 847–875
Plunkett, Jerry 85–93

Q

Quigg, R. J. 49–59

R

Radavich, J. F. 505–516
Richardson, Lee S. 71–84
Richman, M. H. 374–383
Rinnovatore, J. V. .....582–583 (A), 665–671
Roberts, Malcolm J. ..... 577 (A)
Rogers, H. C. 631–643
Rogus, Bernard J. 240–249
Rose, R. M. 132–136
Rosenfield, A. R. .....572–573 (A), 909–919, 962–980
Rozner, A. G. 350–352

S

Sapey, D. 16–25
Scheirer, S. T. 49–59
Schwartz, Lyle H. 468–478
Scott, J. H. 998–1001
Shahinian, P. 411–426
Sherby, Oleg D. 3–15
Shrier, A. 709–743
Silverman, R. 185–194
Simcoe, C. R. .....579–580 (A)
Spies, W. A. 535–543
Staehle, R. W. ..... 581 (A)
Stark, J. P. 479–485, 486–490
Steigerwald, E. A. 113–127
Stiefel, Wayne ..... 586 (A)
Stoll, P. A. 998–1001
Stone, G. 171–184
Stoop, J. 411–426
Strauss, B. P. 132–136
Sullivan, C. P. 1002–1005
Sylwestrowicz, W. D. ..... 582 (A)

T

Tankins, E. S. 525–543
Tromans, D. 673–684
Trout, H. E., Jr. 384–397
Tuffnell, G. W. 769–783
Tufts, C. F. 185–194

U

Uganisky, Gilbert M. ..... 586 (A)
Upthegrove, W. R. 479–485, 486–490

V

Vandervoort, R. R. 930–944
Vansant, Carl A. 105–112

W

Wacker, G. A. ..... 585 (A)
Wagner, C. N. J. 367–373
Warke, W. R. 991–993
Warshal, R. J. 162–170
Webster, G. A. 847–875
Weeks, John R. ..... 583 (A)
Wei, R. P. 981–990
Weiner, R. T 340–342
Weiss, B. 685–693
Weiss, Volker 143–154
Weissmann, S. 491–504, 653–664, 709–743
Wells, M. G. H. 427–438
Westbrook, J. H. 544–556
Woehrle, H. R. 785–803
Woodford, D. A. 398–410
Wriedt, H. A. 998–1001
Wulff, J. 132–136

Y

Yamamoto, H. 653–664

Z

Zackay, V. F. ..... 575 (A)
Zahn, Harold R. 342–344
Zwell, L. 491–504, 998–1001

A

Activation energy of U..... 564
Age hardening in Fe – Ni – Co alloys 60–70
Aging
  in maraging steels..... 263–275
  of Fe alloys..... 429–435
  of Mg alloys..... 250–261
Aircraft turbine blades..... 597–598
Allotropic transformation..... 143
Alloy steels
  effect of strain aging on strength and toughness..... 574 (A)
Aluminum
  brittle failure of polycrystalline Al with liquid Ga..... 318–323
  corrosion-like failure of polycrystalline Al with liquid Ga... 320–323
  crystal study of dislocation substructure..... 709–743
  dislocation configurations..... 97–104
  dislocation density..... 101–104
  failure of single crystal Al with liquid Ga.....320–321, 323
  in maraging steels..... 79
  liquid metal embrittlement by Ga. 315–323
  strengthening due to point defects 573 (A)
  stress-strain curves..... 95
Aluminum alloys, specific types
  Al–Cu eutectic alloy
    dependence of strain rate on temperature.....761, 763–764
    dependence of strain rate sensitivity on strain rate..... 759–761
    dependence of stress on grain size..... 761–762
    grain boundary shear..... 764–765
    strain rate sensitivity of cast and annealed alloy..... 765–767
    superplasticity..... 755–767
  AT-400
    fatigue behavior..... 638–643
    fatigue tests..... 633–634
    fractographic study of high H_2 content alloys..... 634–637
    fractographic study of low H_2 content alloys..... 637–638
  3003 Al-Mn alloy
    effect of precipitation of $MnAl_6$ on recrystallization.....1006–1009
    recrystallization characteristics 1006–1009
  7000-series
    stress-corrosion cracking.....585 (A)
  7075 Al
    stress-corrosion cracking...585–586 (A)
Aluminum-killed steels
  annealed structure..... 813–816
  annealing..... 805
  cold rolled structure..... 810–813
  effect of Mn on toughness..... 451–453
  effects of composition..... 450–452
  electron microscopy..... 806
  evaluation of notch toughness.... 441–445
  ferrite substructure..... 452–453
  fracture behavior..... 445
  impact tests..... 444–445
  influence on AlN on precipitation 816–822
  isothermal grain size texture..... 807–810
  isothermal kinetics..... 806–807
  microcrack observations..... 454
  recrystallization and grain structure..... 804–822
  tension tests..... 445–447
  x-ray diffraction..... 805
  yield data.....445, 448–450
Aluminum nitrides
  effect on precipitation in Al-killed steels..... 816–822
Aluminum oxide composites....572–573 (A)
Aluminum oxides
  as dispersions in NiAl and FeAl.. 860–875
Aluminum-semikilled steels
  effect of Mn on toughness..... 451–453
  effects of composition..... 450–452
  evaluation of notch toughness.... 441–445
  ferrite substructure..... 452–453
  fracture behavior..... 445
  impact tests..... 444–445
  microcrack observations..... 454
  tension tests..... 445–447
  yield data.....445, 448–450
Aluminum wires
  wiredrawing by ultrasound..... 690–692
ASM Annual Dinner..... 1056
ASM Annual Meeting.....1039–1056
ASM Awards and Honors.....1016–1021
ASM Awards Luncheon.....1038–1039
ASM Chapters and Chapter Officers 1029–1036
ASM Councils and Standing Committees.....1021–1028
ASM Election of Officers.....1055–1056
ASM Foundation for Education and Research.....1040–1041
ASM Managing Director's Report.1052–1055
ASM Metal Science Forum
  New insights into strengthening.. 572–580
  Stress-corrosion..... 581–587
ASM President's Report.....1042–1044
ASM Secretary's Report..... 1045
ASM Technical Programs at 48th Annual Convention.....1036–1038
ASM Treasurer's Report.....1046–1051
Anisotropy of tool steels...306–308, 310–313
Annealing
  effect of fatigue of maraging steels..... 769–781
  of steel..... 805

Armco iron
dislocations due to strain 19–25
etch pitting 16–19
Athermal stabilization of austenite . 784–802
Ausforming ..... 574 (A)*
Austenite
athermal stabilization 784–802
in Fe – Ni – Co system 61–63
in maraging steels 273–275
in steel wire 289
mechanism of austenite stabilization 794–802
relationship of athermal stabilization to quenching rate 793–802
studied by Mossbauer effect in steels 469–472
Austenite grain boundary delineation
of die steels 128–131
of tool steels 128–131
Austenite grain refinement use in strengthening steel 26–48
Austenitic stainless steels
corrosion 550–556
effect of grain size on yield strength 46
hardening with precipitation of $Ni_3Nb/Ta(\gamma')$ 340–342
structure 546–550
tensile testing 223–239
Autoradiographic penetration measurements of Pb 480–485

B

Bearing steels, specific types
AISI 52100
deformation 146–153
ferrite → austenite transformation 146–153
plasticity 146–153
Bend tests of NiAl oxide dispersions . 870
Beryllium
analysis of bond character 375–378
cleavage energies 379–382

C

Cadmium
analysis of bond character 375–378
cleavage energies 379–382
Cadmium-cerium system partial phase diagram 352–355
Cadmium-lanthanum system partial phase diagram 352–355
Cadmium-neodymium system partial phase diagram 352–355
Cadmium-promethium system partial phase diagram 352–355
Cadmium-samarium system partial phase diagram 352–355
Campbell Memorial Lecture 596–629
Capping of Mo alloys 457–467
ϵ-carbide structures in Fe alloys 430–437
Carbides in Ni alloys 506–515
Carbon in maraging steels 80–81, 82
Cast iron
eutectic growth 949–951
freezing process 946–949
nucleation model 961
primary phase solidification 957–958
Casting solidification
area lost by wall contact 959–960
computer simulation of freezing .. 951–957
eutectic growth 949–951
freezing process 946–949
heat flow across a cylinder 961
nucleation model 949
primary phase solidification 957–958
Cellular solidification 163–170
Cementite structures in Fe alloys ... 430–437
Chemical polishing of Ti alloys 695–697
Chromium oxides coating on 316 stainless steel 328–330
Cleavage
of hcp crystals 374–383
of steel 971–974
Cleavage stress
dependence on temperature 916
in steel 910–912
Cobalt in maraging steels 76–78
Coercive force
of Fe alloys 430–435
of maraging steels 264–266, 268–273
Cold working
of Ta alloys 367–368
of W alloys 367–368
Compression tests
of NiAl 933–934
of steel 837–841
Computers use in simulation of freezing of castings 951–957
Copper alloys, specific types
Cu – 2% Be
effect of grain boundary penetration of delayed failure ..... 582–583 (A)
effect of grain boundary penetration on delayed failure in presence of Hg-Na amalgam . 665–671
effect of stress on failure in presence of Hg-Na amalgam 666–669
Copper-bismuth-thallium system
dihedral angle measurements 243
interfacial energies 243–249
preparation 241–243
Corrections to
Anisotropy and Its Relationship to Deep Drawing of a 5% Cr Tool Steel (H-11) 591
Calculation of Cleavage Characteristics of Hexagonal-Close-Packed Crystals 1069

* (A) = Abstract only.

Prediction by Computer of Corrosion and Hydriding of Zircaloy-4 under Heat Transfer Conditions ... 360
The Strength and Toughness of Dynamically Strain-Aged Alloy Steels ... 1069
Structures and Strengthening Mechanisms in Carbon Steel Wire ... 591
Corrosion
of Hf ... 393–395
of stainless steels ... 550–556
Cottrell equation applied to steels ... 439–456
Crack growth ... 899–907
Crack propagation in Mo alloys ... 459
Creep
of Fe alloys ... 3–15
of Ni ... 400–410
of Ni alloys ... 847–859, 1002–1004
of Nb alloys ... 277–287
of Ag ... 892–896
of Ag alloys ... 892–897
of stainless steels ... 330–338
of W ... 748–750
of W alloys ... 750–754
of U ... 557–566
Creep-rupture of Nb ... 417–425
Crystals
analysis of the stress distribution in bent crystals ... 741–743
boundaries as stress raisers ... 718–719
decoration of defect structure by cycling with alternating strain amplitudes ... 735–736
dislocation substructure ... 709–743
elastic stiffness ... 600–605
extension of fatigue life ... 709–743
extension of fatigue life through control of dislocation substructure ... 729–731
fluidity of internal boundaries ... 612–615
fragility of interfaces ... 607–612
incompatability at boundaries ... 616–618
influence of internal boundaries on strength ... 605–607
influence of stacking fault energy ... 719–720
observations on crack propagation ... 737–738
proposed mechanism of structural changes induced by fatigue ... 731–735
reversibility of structural transformations induced by fatigue ... 726–729
strain distribution and development of lattice defects in crystals with boundaries ... 718–726
strain distribution and development of lattice defects in fatigued crystals without boundaries ... 713–718
strength ... 599–618
structural modifications in crystals with boundaries ... 720–726
viscoelastic instability ... 615–616
Current-carrying capacities of Nb – Sn ... 189–193

D

Deformation
of Ni alloys ... 1002–1004
of NiAl ... 930–943
Die forgings parting plane effects on fracture mode and toughness ... 342–344
Die steels, specific types
H21
austenite grain boundary delineation ... 128–131
heat treatment ... 128
Mod H-11
composition ... 114
heat treatment ... 115
magnetic properties ... 117, 120–121
mechanical properties ... 116
Diffusion in three-component solid solutions ... 517–523
Diffusion coefficients in ternary systems ... 521–533
Dilatometric measurements of white cast iron ... 1010–1014
Discussions
Application of a modified two-load method for the determination of low-temperature true stress-strain properties of several commercial titanium and maraging steel alloys ... 137–139
Carbide formation from beta-titanium and graphite ... 1061
Creep ductility and dimensional instability of nickel at 500 and 525 C ... 1061–1064
Dislocation substructure in iron induced by alpha-gamma-alpha transformation cycling ... 1065–1066
Effects of a manganese-oxygen interaction on the recrystallization of iron ... 1057–1060
Effects of experimental rolling during continuous cooling through the critical temperature range on mechanical properties of low carbon, low alloy steels ... 588–590
Phase reactions in B-1900 nickel-base alloy ... 1067–1068
Structural basis for superplasticity 356–359
Dislocation substructure of crystals ... 709–743
Double-extrusion use in Ni superalloys ... 49–59
Drawing
of Nb – Cu composites ... 132–136
of tool steels ... 310–314
Ductile rupture of steel ... 969–971, 978–980

Ductility of Fe....572–573 (A)
Duplex annealing of Ti alloys.... 697–699

E

Elastic stiffness
of crystals.... 600–605
of intermetallic compounds.... 604–605
of metals.... 600–603
of salts.... 603–604
Elasticity of monocrystals.... 619
Electrical conductivity of W composites.... 994–997
Electrical resistivity
of maraging steels....264–266, 268–273
of W composites.... 994–997
Electron microprobe analysis of Mo alloys.... 463–464
Electron microscopy
of Al....94–105, 712
of Al alloys....633–643, 1006–1009
of die steels.... 128–131
of Fe.... 492–503
of Fe alloys.... 427–437
of liquid metal embrittlement of Al by Ga.... 315–323
of Ni alloys....
..506–515, 657–661, 855–856, 1002–1004
of Nb – Cu composites.... 132–136
of Ag alloys.... 217–219
of stainless steels.... 546–550
of steel....806, 841–842, 983–990
of Ti alloys.... 876–889
of tool steels.... 128–131
of Zn.... 674–677
of Zn alloys.... 674–677
preparation of thin films.... 345–349
Electroplating of Sn on Fe.... 644–650
Electrostatic devices using monocrystals.... 626
Elongation of Hf.... 390
Etch pitting
armco iron.... 16–19
Fe alloys....16, 19–20
Etching of steels to reveal strain.... 991–993
Eutectic growth.... 949–951
Eutectoid decomposition.... 143
Evaporation of stainless steels.... 324–339

F

Fabrication of Hf.... 387
Failure
of Al liquid Ga embrittlement couple.... 316–323
of Cu alloys.... 666–669
of steels.... 584 (A)
of tool steels.... 303–305
Fatigue
of Al alloys....633–634, 638–643
of crystals.... 709–743
of maraging steels.... 769–782
of Ti alloys.... 195–206
Faulting
of Ta alloys.... 368–373
of W alloys.... 368–373
Ferrite in Fe – Ni – Co system.... 61–63
Ferrite substructures in steel.... 452–453
Fick second law applied to a ternary system.... 518–533
Finite diffusion systems.... 529–531
Flow stresses of steel.... 833–837
Flow stresses
in α-Ti.... 175–179
of NiAl.... 934–935
of Zn.... 677–684
of Zn alloys.... 677–684
Fluidity of crystals.... 612–615
Fourier of analysis
of Ta alloys.... 368–373
of W alloys.... 368–373
Fractography of Ti alloys.... 195–206
Fracture
of Al alloys.... 634–638
of die forgings.... 342–344
of Ni alloys....1002–1004
of steel.... 445, 581–582 (A), 584 (A), 969–974, 983–990
of Ti.... 920–990
plane-strain instability.... 904–905
slow crack growth.... 905–907
subcritical cracking.... 899–904
Fracture strength of crystals.... 607–612
Freezing of cast iron.... 946–949

G

Gallium embrittling of Al.... 315–323
Gamma-prime solutioning of Ni superalloys.... 52–56
Gold plating of stainless steels.... 85–86
Grain boundary penetration of Cu alloys.... 665–671
Grain boundary self-diffusion of Pb. 480–490
Grain boundary shear of Al alloys.. 764–765
Grain size
dependence of stress on, in Al alloys.... 761–762
of Fe alloys.... 3–5
of steel.... 824–845
of Zn.... 678–684
of Zn alloys.... 678–684
Grain structures in steel.... 804–822

H

Hafnium
analysis for O_2.... 386–387
effect of O_2 on cold fabrication.... 387
effect of O_2 on corrosion.... 393–395
effect of O_2 on elongation of wrought strip.... 390
effect of O_2 on impact properties...392–393
effect of O_2 on reduction of area of wrought strip.... 390
effect of O_2 on hardness.... 387–388
effect of O_2 on hot fabrication.... 387

effect of O_2 on tensile properties of weld metal 390–392
effect of O_2 on tensile strength of wrought strip 389–390
effect of O_2 on yield strength of wrought strip 388–389
effects of a notched tensile specimen on tensile properties 395–396
Hall-Petch equation 833–837
Hardness
of Mg alloys 253–256
of maraging steels 264–266, 268–272
of Nb 413–414
of Ag alloys 211–216
Heat treatment of Ni superalloys 52–56
Hemispherical emittance of stainless steels 85–93
High-strength steels
development by grain refinement 26–48
etching to reveal strain 991–993
failure in stress-corrosion tests ..... 584 (A)
influence of aggressive environments of fracture ..... 581–582 (A)
magnetic properties 113–127
seawater stress-corrosion ..... 584–585 (A)
Hydroforming of tool steels 303
Hydrogen
effect of, in fatigue of Al alloys 630–643
equilibrium of, with O_2 in liquid Fe – Pt 535–542

I

Impact properties of Hf 392–393
Impact resistance of monocrystals 625–626
Impact tests of steel 444–445
Indium effect on diffusion of Pb 487, 489
Induced boundary energy 616–618
Infinite diffusion systems 527–529
Integral breadth measurements
of Ta alloys 368–373
of W alloys 368–373
Interdiffusion heat treatment 186
Interfaces of crystals 607–612
Interfacial energies of Cu – Bi – Th system 243–249
Intermetallic compounds elastic stiffness 604–605
Iron
α-γ transformation cycling 492–503
dislocation substructures 492–503
ductility ..... 572–573 (A)
electroplating of Sn 644–650
measurement of orientation of Fe and Sn layers 647–650
Iron alloys, specific types
structure of nitrided alloys ..... 578–579 (A)
Fe – 0.035% C
aging 429–435
ϵ-carbide structures 430–437
cementite structures 430–437
coercive force 430–435
tensile strength 430–435
two-stage precipitation 430–437
yield stress 430–435
Fe – Ni alloys
strength ..... 577 (A)
Fe – 23Ni – 4C
ausform strengthening ..... 574 (A)
Fe – N alloys
stress orienting of $Fe_{16}N_2$ ..... 577 (A)
Fe – Pt alloy
equilibrium of H_2 with O_2 in liquid Fe-Pt 535–542
Fe – Si alloy ductility ..... 572–573 (A)
Fe – 3Si alloy
annealing for different grain sizes 4
creep due to influence of grain size 3–15
dislocation density 4–15
etch pitting 16, 19–20
substructure changes due to strain 5–11
Iron aluminides
oxide dispersions of Al_2O_3 860–875
stress-rupture tests 873–874
Iron aluminide – aluminum oxide dispersions
microstructure 868–869
preparation 860–862
stress-rupture tests 873–874
Iron composites ductility ..... 572–573 (A)
Iron – nickel – cobalt system
austenite structures in 61–65
correlation of structure with age hardening 60–70
ferrite structures in 61–63
martensite structures in 61–63, 65
massite structures in 61–63
microstructure data 66–69
structure based on neutron diffraction 66
Iron – nickel – manganese system
effect of Co and Mo on mechanical properties 76–78
effect of Si and C on mechanical properties 80–81, 82
effect of Ti and Al on hardening 79
effect on V additions on mechanical properties 70–80, 82
formation by partial substitution of Mn for Ni 71–73
hardening 73
mechanical properties 75
Iron nitrides in Fe – N alloys ..... 577 (A)
Iron wires wiredrawing by ultrasound 690–692
Isoforming ..... 573–574 (A)

L

Lattice diffusion of Pb 483
Lattice parameters of Ag alloys 211–216
Lead
activation energies 484–485

Lead (*continued*)
autoradiographic penetration measurements 480–485
diffusion along twist grain boundaries 485
effect of In or grain boundary diffusion 487, 489
effect of solutes on grain boundary self-diffusion 487–488
effect of Tl on grain boundary diffusion 487–488
effect of Sn on grain boundary diffusion 487, 489
grain boundary self-diffusion 480–490
lattice diffusion 483
Lead wires wiredrawing by ultrasound 690–692
Line broadening analysis
of Ta alloys 367–373
of W alloys 367–373
Liquid metals embrittlement ..... 583 (A)

M

Magnesium
analysis of bond character 375–378
cleavage energies 379–382
Magnesium alloys, specific types
Mg — 8.2% Y
aging behavior 250–261
hardness after aging 253–256
preparation 251–253
tensile tests after aging 257–259
Mg — 9% Y
aging behavior 250–261
hardness after aging 253–256
oxidation resistance 260
preparation 251–253
tensile tests after aging 258–259
Mg — 10.6% Y
aging behavior 250–261
hardness after aging 253–256
preparation 251–253
rolling texture 260
tensile tests after aging 257–259
AZ31 Mg alloy
stress-corrosion cracking ..... 586 (A)
Magnetic properties of steels 113–127
Magnetization
of Ni 653–656, 663
of Ni alloys 653–657, 663
Magnets using monocrystals 626
Manganese
effect of toughness of steel 451–453
substitution in maraging steels 71–84
Manganese aluminides, effect on recrystallization of Al alloys 1006–1009
Maraging steels magnetic properties 124–126
Maraging steels, specific types
15 Ni
aging 263–275
α-γ transformation X63
austenite structure 273–275
effect of aging on electrical resistivity 264–266, 268–273
effect of aging on hardness 264–266, 268–272
effect of structure on change of properties 273–275
influence of deformation and annealing on aging 268–270
microstructure 266
18 Ni
effect of annealing temperature of rotating beam fatigue life 773
effect of Co and Mo on mechanical properties 76–78
effect of Si and C on mechanical properties 80–81, 82
effect of solution annealing treatment by fatigue 774–776, 779–781
effect of Ti and Al on hardening 79
effect of V additions on mechanical properties 79–80, 82
effect of various processing treatment on rotating beam fatigue life 776–781
fatigue properties 771–774, 778
formation of Fe – Ni – Mn base maraging steels 71–73
partial substitution of Mn for Ni 71–84
18Ni – 8Co – 5Mo
Mossbauer effect 475–477
precipitation reactions and changes in austenite content. 475–477
20 Ni
composition 114
heat treatment 115
magnetic properties 117, 120–121, 124–126
mechanical properties 116
200 grade
composition 114
heat treatment 115
magnetic properties 117, 120–121, 124–126
mechanical properties 116
250 grade
composition 114
heat treatment 115
magnetic properties 117, 120–121, 124–126
mechanical properties 116
substitution of Al and V for Ti 580 (A)
thermal embrittlement ..... 580 (A)
Martensite 227–228
in Fe – Ni – Co system 61–63
in stainless steels during tensile testing 236–238
in steel 36–40
in Ti alloys 878–883
Massite in Fe – Ni – Co system 61–63
Mechanical properties of steels 986

Mercury amalgams, wetting of Cu alloys to study delayed failure.... 665–671
Metals elastic stiffness..... 600–603
Mill annealing of Ti alloys..... 697–699
Molybdenum in maraging steels... 76–78
Molybdenum
in maraging steels..... 76–78
use as capping material..... 457–467
Molybdenum alloys, specific types
Mo-TZC type
capping with Mo.....458–459, 465–467
crack study of capped and uncapped alloy..... 459
effect of capping on tensile and rupture properties..... 464–465
electron microprobe analysis of capped alloy..... 463–464
ingot melting of capped and uncapped alloy..... 456
structure study of capped surface..... 459–462
Monocrystals
elastic design..... 619
fabrication..... 624
impact resistance..... 625–626
plastic design..... 619–623
reliability..... 623–624
use in electrostatic devices..... 626
use in magnets..... 626
use in pressure vessels..... 625
use in rotating machinery..... 626
Mössbauer effect in steels.469–472, 472–477

N

Neutron irradiation
of Nb alloys..... 568–570
New insights into strengthening, ASM Metal Science Forum..... 572–580
Nickel
creep..... 400–410
dependence of magnetization on annealing temperature...653–656, 663
dependence of Young's modulus on annealing temperature.....653–656, 659–662
effect of temperature and gage length on creep..... 400–406
shape of strain rate creep curves. 401–408
strain aging during creep..... 408
Nickel alloys, specific types
B-1900
as-cast microstructure..... 508–509
carbide precipitations..... 510–514
carbide reactions..... 510–514
effect of temperature and stress exposure on structural stability..... 508–510
structure study..... 506–515
Mar-M-200
effect of constant temperature and cyclic load on creep.....850–853, 857–858
effect of cyclic temperature and constant load on creep..853–854, 858
effect of cyclic temperature and cyclic load on creep....854–855, 858
structural changes during creep. 855–856
Ni — 3.98% Cu
dependence of magnetization on annealing temperature..653–656, 663
dependence of Young's modulus on annealing temperature.....653–656, 659–662
Ni — 10.41% Cu
dependence of magnetization on annealing temperature.653–656, 663
dependence of Young's modulus on annealing temperature.....653–656, 659–662
Ni — 15.48% Cu
dependence of magnetization on annealing temperature.653–656, 663
dependence of Young's modulus on annealing temperature.....653–656, 659–662
structural modifications resulting from annealing..... 657–663
Ni — 23.14% Cu
dependence of magnetization on annealing temperature..653–657, 663
dependence of Young's modulus on annealing temperature.....653–657, 659–662
Ni — 6Ti
strengthening by internal carburization forming TiC dispersion..... 578 (A)
Udimet 700
microstructure studies of deformation and fracture in static creep.....1002–1004
Nickel aluminides
bend tests..... 870
compression testing..... 933–934
effect of shear stress on creep.... 935–936
flow stress..... 934–935
high-temperature deformation... 938–939
intermediate temperature deformation..... 939–943
microstructure..... 865
modes of deformation..... 936–938
oxide dispersions of Al_2O_3, ThO_2 and Y_2O_3..... 860–875
slip bands..... 155–161
slip dislocations..... 155–161
stress-rupture tests..... 873–874
structure..... 932–933
tensile tests..... 870–872
Nickel aluminide—aluminum oxide dispersions
bend tests..... 870
consolidation..... 862–865
microstructure..... 868
preparation..... 860–862

Nickel aluminide–aluminum oxide dispersions (*continued*)
stress-rupture tests ... 873–874
tensile tests ... 870–872
Nickel aluminide – thorium oxide dispersions
consolidation ... 862–865
microstructure ... 864–868
preparation ... 860–862
stress-rupture tests ... 873–874
tensile tests ... 870–872
Nickel aluminide – yttrium oxide dispersions
bend tests ... 870
consolidation ... 862–865
microstructure ... 864–865
preparation ... 860–862
stress-rupture tests ... 873–874
tensile tests ... 870–872
Nickel superalloys
cast composition ... 50
double-extruded
effect of heat treatment on structure ... 52–56
gamma-prime solutioning ... 52–56
heat treatment ... 52–56
stress-rupture properties ... 56–57
tensile properties ... 57
wrought
composition ... 49
produced by double extrusion ... 49–59
Nickelides, use in hardening austenitic stainless steels ... 340–342
Niobium
effect of microstructure on creep ... 422–423
effect of N_2 on creep-rupture properties ... 417–425
effect of N_2 on hardness ... 413–414
effect of N_2 on tensile strength ... 415–417
Niobium alloys, specific types
B-66 creep properties ... 282–287
Cr-753
comparison of creep properties with other Nb alloys ... 282–287
creep properties ... 277–282
D-43 creep properties ... 282–287
Nb — 40% V
effect of neutron irradiation on twinning ... 568–570
effect on twinning on structure 568–570
Nb — 1% Zr
creep properties ... 282–287
Niobium-copper composites
drawing ... 132–136
electron micrography ... 132–136
electron microscopy ... 132–136
fabrication ... 132
Niobium stannides
current-carrying capacity ... 189–193
microstructure ... 187–189
phase interfaces ... 190–193
preparation by interdiffusion heat treatment ... 185–186
Niobium-tin wire composites
current-carrying capacity ... 189–193
microstructure ... 187–189
phase interfaces ... 190–193
preparation by interdiffusion heat treatment ... 185–186
Nitrogen
impregnated on steel ... 998–1001
influence on creep-rupture properties of Nb ... 417–425
influence on tensile properties of Nb ... 413–417
Nitrogen tetraoxide, stress-corrosion cracking of Ti alloys ... 586–587 (A)
Notch toughness of steel ... 441–445
Nucleation model ... 949

O

Oxygen
activity of in liquid Fe – Pt ... 535–542
effect of properties of Hf ... 384–397

P

Pauling's metallic bond theory ... 374–383
Plane-strain instability ... 904–905
Plastic constraint
method for measuring crack extension by cleavage of mild steel 910–915
strain rate ... 917–919
Plastic instability ... 399–400
Plasticity
of monocrystals ... 619–623
of steels ... 146–153
Point defects ... 573 (A)
Precipitation hardening ... 579–580 (A)
Pressure vessels using monocrystals 625
Primary austenite solidification ... 162–170

Q

Quasi-cleavage of Ti alloys ... 199–201, 204–206
Quenching rates, relationship to athermal stabilization of austenite 791–802

R

Recrystallization
in steel ... 804–816
of Al alloys ... 1006–1009
Refractory metals, preparation of thin films ... 345–349
Resistometric measurements of white cast iron ... 1010–1014
Rhenium strengthening by alloying with refractory compounds ... 579 (A)
Rimmed steels
annealed structure ... 813–816
annealing ... 805
cold rolled structure ... 810–813
electron microscopy ... 806
isothermal grain size texture ... 807–810
isothermal kinetics ... 806–807

recrystallization and grain structure ... 804–822
x-ray diffraction ... 805
Rotating beam fatigue life of maraging steels ... 772–778
Rotating machinery using monocrystals ... 626
Rupture properties of Mo alloys ... 464–465

S

Salts, elastic stiffness ... 603–604
Seawater stress-corrosion resistance ... 584–585 (A)
Semiinfinite diffusion systems ... 525–527
Silicon in maraging steels ... 80–81, 82
Silver
creep ... 892–896
crystal study of dislocation substructure ... 709–743
crystal study of extension of fatigue life ... 709–743
Silver alloys, specific types
Ag – Al alloys
annealing ... 210
dependence of hardness on oxidation temperature ... 211–216, 219–221
dependence of lattice parameters on temperature ... 211–216, 219–221
internal oxidation ... 210
lattice parameters ... 211–216
metallography ... 210–211
microhardness ... 211–216
Ag – Mg alloys
annealing ... 210
creep ... 892–896
creep of internally oxidized alloys ... 896–897
dependence of hardness on oxidation temperature ... 211–216, 219–219
electron microscopy ... 217–219
internal oxidation ... 210
lattice parameters ... 211–216
line broadening ... 216–217
metallography ... 210–211
microhardness ... 211–216
Slip bands of Ni_3Al ... 155–161
Slip dislocations of Ni_3Al ... 155–161
Slow crack growth ... 905–907
Spiking solidification ... 163–170
Stainless steels, specific types
AFC-77
deformation mechanism ... 299
tensile strength ... 299–300
wire drawing ... 299
AM 367
composition ... 114
heat treatment ... 115
magnetic properties ... 117, 120–121
mechanical properties ... 116
Code P
composition ... 114
heat treatment ... 115
magnetic properties ... 117, 120–121
mechanical properties ... 116
17 – 7PH
Mössbauer effect ... 473–475
precipitation reactions and changes in austenite content ... 473–475
301
effect of test speed on tensile properties ... 229–231
elongation ... 225–226
flow stress ... 229
martensite formation during tensile testing ... 227–228
relationship of tensile properties to martensite formation at various test speeds ... 231–236
tensile strength ... 225–226
work-hardening rates ... 229
304
effect of martensite formation on tensile properties ... 235–236
electropolished
hemispherical emittance ... 86–89
interplanar spacings ... 90
electropolished and gold-plated
activation energy ... 91
elemental interdiffusion ... 91
hemispherical emittance ... 86–89
interplanar spacings ... 90
electropolished and gold-plated
hemispherical emittance ... 86–89
interplanar spacings ... 90
structure study by electron microscopy ... 546–550, 554–556
310
effect of test speed on tensile properties ... 231
316
effect of evaporation on microstructure ... 335–337
evaporation of Cr_2O_3 oxidized surfaces ... 328–330
influence of exposure to vacuum through creep-rupture tests ... 330–338
rate of evaporation from 780–960 C ... 325–329
Steel wires
isothermally transformed ... 289–292
mechanism of deformation ... 295–299
microstructure ... 292
tempered martensitic wire ... 292–295
tensile strength ... 291–293
Steels
ausform strengthening ... 574 (A)
cleavage ... 971–974
cleavage stress ... 910–911
compression tests ... 837–841
crack extension by cleavage ... 911–912
ductile rupture ... 969–971, 978–980
effect of grain size on stress-strain data ... 824–845
electron micrograph study ... 841–842

Steels (*continued*)
fracture stress and strain 969–974
grain size 828–833
grain size-lower yield stress relation 834–836
Hall-Petch equations for flow and yield stress 833–837
isoforming ..... 573–574 (A)
measurement of plastic constraint 910–915
relationship between Lüders strain, grain size and C content 836
strengthening by strain tempering ..... 575–576 (A)
stress-strain data 827–828
surface stress 998–999
surface stress when impregnated with N_2 998–1001
work hardening parameters 968–969
yield stress 963–968
Steels, specific types
AISI-SAE types
1018
deformation 146–153
ferrite ⇄ austenite transformation 146–153
plasticity 146–153
1045
deformation 146–153
ferrite ⇄ austenite transformation 146–153
heat treating 27–29
microstructure studies 29–31
plasticity 146–153
strength 27–31
1095
deformation 146–153
ferrite ⇄ austenite transformation 146–153
plasticity 146–153
4320
composition 114
heat treatment 115
magnetic properties 117–124
mechanical properties 116
4340
composition 114
delayed failure in boiling aqueous solutions ..... 581 (A)
etching to determine plastic zone sizes in precracked tensile specimens 993
etching to reveal strain 991–993
heat treatment 115
magnetic properties 117–124
mechanical properties 116
8640
hardenability 42–46
heat treating 29–42
microstructure studies 30–40
strength 29–40
yield strength 40–42
52100
austenitizing and quenching . 786–788
martensite transformation ... 788–790
observation of athermal stabilization 792–793
quenching rates 791–792
retained austenite measurement 790
sources of scatter 793
API 51X52, tensile properties ... 978
0.45C – Ni – Cr – Mo
fractography 986–990
fracture process 983–985
mechanical properties 986
structure 985–990
Strain aging of Ni 408
Strain hardening
of Al 103–104
of steel 824–845
Strain rates
in α-Ti 179–182
in plastic zone ahead of a sharp crack 917–919
of Al alloys 759–767
of Ni 401–408
Strain tempering ..... 575–576 (A)
Strength of crystals 599–627
Stress-aging ..... 576–577 (A)
Stress-corrosion, ASM Metal Science Forum 581–587
Stress-corrosion cracking ..... 581 (A)
of Al alloys ..... 585–586 (A)
of Mg alloys ..... 586 (A)
of steels ..... 584 (A)
of Ti alloys ..... 585–587 (A)
Stress-corrosion fracture, effect of temperature ..... 582 (A)
Stress-rupture properties
of crystals 615–616
of Ni superalloys 56–57
Stress-rupture tests of NiAl and FeAl oxide dispersions 873–874
Stress-strain curves in α-Ti 173–175
Stresses in steels 998–1001
of Cu alloys 666–669
of Zn 677–684
of Zn alloys 677–684
Subcritical cracking 899–904
Submarines ..... 585 (A)
Sulfur in white cast iron 168–169
Superconductivity Nb_3Sn 185–193
Superplasticity 755–757
of Al alloys 758–767
Swelling of U 564–566

T

Tantalum alloys, specific types
Ta – 10% Re
line broadening resulting from cold working 367–373
Tensile properties
of austenitic stainless steels 223–239

of Hf.....388–392, 395–396
of Mo alloys.....464–465
of Ni superalloys.....57
of steel.....32–40
of TiNi.....350–352
of U.....557–567
Tensile strength
of carbon steel wire.....291–293
of Hf.....389–390
of Fe alloys.....430–435
of Nb.....415–417
Tensile tests
of Mg alloys.....257–260
of NiAl oxide dispersions.....870–872
of steel.....445
of Ti.....921–925
Thalium, effect of diffusion of Pb...487–488
Thin films preparation.....345–349
Thorium oxides as dispersions in NiAl.....860–875
Three-component diffusion
diffusion coefficients.....521–523
diffusion equations.....518
diffusion path.....518–521
finite diffusion systems.....529–531
infinite diffusion systems.....527–529
semiinfinite diffusion systems.....525–527
Three-component solid solutions diffusion.....517–523
Tin
effect on diffusion of Pb.....487, 489
electroplated on Fe.....644–650
measurement of orientation of Fe and Sn layers.....647–650
Titanium
brittle fracture.....920–929
characteristics of microcracks....925–927
deformation modes.....182–183
dislocations in α-phase.....703–704
effect of strain rate.....179–182
effect of temperature on yield and flow stresses.....175–179
in maraging steels.....79
interrupted tensile tests.....924–925
relationship between second-order twinning and transition temperature.....927–929
stress-strain curves.....173–175
uninterrupted tensile tests.....921–924
Titanium alloys, stress-corrosion cracking.....585 (A)
Titanium alloys, specific types
Ti – 6Al – 4V
fractography in air.....196, 203–206
fractography in aqueous environment.....196, 203–206
low-cycle fatigue in air.195–196, 198–199
low-cycle fatigue in aqueous environment.....195–196, 198–199
stress-corrosion cracking in N_2O_4.....586–587 (A)
Ti – 7Al – 2Nb – 1Ta
fractography in air.196, 199–201, 205–206
fractography in aqueous environment.....196, 201–203, 205–206
low-cycle fatigue in air.....195–197
low-cycle fatigue in aqueous environment.....195–197
quasi-cleavage.....199–201, 204–206
Ti – 8Al – 1V – 1Mo
decomposition of the β-phase..699–702
dislocations in α-phase and comparison with Ti and Ti – 9Al 703–704
effect of deformation on mechanical properties.....704–706
electron microscopy study.....695–707
ordering in the α-phase.....699
structure after chemical polishing.....695–697
structure after mill and duplex annealing.....697–699
structure of the α-phase.....877–878
structure of the β-phase and martensitic transformation..878–883
tempering of the β-phase and the martensites.....883–887
Ti — 9Al
dislocations in α-phase.....703–704
ordering in the α-phase.....699
Titanium carbides
diffusion coefficients.....110
formation from β-Ti and C.....105–112
Titanium-carbon system
equilibrium carbon concentration 110
formation of TiC layer.....105–112
Titanium nickelides, effect of cold work on tensile properties.....350–352
Tool steels, specific types
H-11
anisotropy.....306–308
factors effecting drawability...314
failure.....303–305
hydroforming.....303
mechanical properties.....305, 307
microstructure.....306, 308
relation between anisotropy and drawability.....310–313
x-ray diffraction.....306, 309
M2
austenite grain boundary delineation.....128–131
heat treatment.....128
M10
austenite grain boundary delineation.....128–131
heat treatment.....128
Tungsten alloys, specific types
W — 3% Re
creep.....750–754
structure after creep.....753
W — 20% Re
line broadening resulting from cold working.....367–373

Tungsten alloys (*continued*)
W — 1% ThO_2
creep 750–754
structure after creep 753
Tungsten-fiber-reinforced copper composites, electrical resistivity and conductivity 994–997
Tungsten wires
creep 748–750
structure after creep 753
Twinning of Nb alloys 568–570

U

Ultrasound use in wiredrawing 685–692
Uranium
activation energy for creep 564
creep 557–566
swelling 564–566
tensile properties 563

V

Vanadium in maraging steels 70–80, 82
Variance analysis
of Ta alloys 368–373
of W alloys 368–373

W

White cast iron
cellular solidification 163–170
effect of S 168–169
primary austenite solidification 162–170
spiking solidification 163–170
structural changes at subcritical temperature by dilatometric and resistomeric methods 1010–1014
superheating temperature effect 163–168
Wiredrawing
by ultrasound 686–692
of Al, Fe and Pb by ultrasound 690–692
Working hardening parameters of steel 968–969

X

X-ray diffraction
of Ni alloys 507–508
of steel 805
of Sn-plated Fe 647–648
X-ray microscopy
of Al 711–712
of Fe 495–503
of Ag 711–712

Y

Yield strength
of Hf 388–389
of steel 31–45
Yield stresses
in α-Ti 175–179
of Fe alloys 430–435
of steel 833–837, 963–968
Young's modulus
of Ni 653–656, 659–662
of Ni alloys 653–656, 659–662
Yttrium oxides as dispersions in NiAl 860–875

Z

Zinc
analysis of bond character 375–378
cleavage energies 379–382
effect of grain size on stress 677–684
low-temperature strain behavior 677–681
mechanical tests 674
metallography 674–676
microstructure studies 674–676
Zinc alloys, specific types
Zn-ZnO alloy
effect of grain size on stress 677–684
low-temperature strain behavior 677–681
mechanical tests 674
metallography 674–676
microstructure studies 674–676
room-temperature stress behavior 680–683

Transactions

OF AMERICAN SOCIETY FOR METALS

Volume LIX
March-June-September-December 1966

John Parina, *Editor*

Kathleen Zombory, *Editorial Assistant*

Published by American Society for Metals
Metals Park, Ohio

TRANSACTIONS COMMITTEE

Chairman, William C. Leslie

Members:

Fred J. Anders, Jr.
Lynn J. Ebert
Henry Inouye
Joseph R. Lane
H. R. Ogden
N. M. Parikh
Paul Gordon
John Preston
Richard A. Swalin
John R. Weeks
Jack H. Wernick
Franklin H. Wilson
George S. Ansell
B. R. Banerjee
J. B. Clark
Sidney L. Couling
George H. Robinson
E. T. Stephenson

Staff Liaison, John Parina

NATIONAL OFFICERS OF AMERICAN SOCIETY FOR METALS

President, Stewart G. Fletcher
Vice-President, John Convey
Secretary, Carl H. Samans
Treasurer, William D. Manly
Trustees: Past President, John A. Fellows
Donald J. Blickwede
John P. Clark, Jr.
Henry A. Curwen
J. Robert Kattus
Thomas E. Leontis
Nathan E. Promisel

Managing Director
Allan Ray Putnam

Director, Periodical Publications
Allen G. Gray

Copyright © 1966 by the American Society for Metals
All Rights Reserved
Printed in U.S.A.

CONTENTS

The Influence of Strain and Grain Size on the Creep Substructure of Fe – 3Si
Craig R. Barrett, William D. Nix, Oleg D. Sherby 3

The Etch-Pitting Response of Annealed and Deformed Armco Iron
G. T. Hahn, D. Sapey 16

Strengthening Steel by Austenite Grain Refinement
R. A. Grange 26

Extrusion of Cast Nickel-Base Superalloys
S. T. Scheirer, R. J. Quigg 49

Age Hardening and Structure of Iron – Nickel – Cobalt Alloys
J. R. Mihalisin 60

The Partial Substitution of Manganese for Nickel in Maraging Steel
William R. Patterson, Lee S. Richardson 71

Time-Temperature Total Hemispherical Emittance Study of Gold-Plated Stainless Steel
Michael Deitch, Jerry Plunkett 85

Dislocation Configurations Developed in Aluminum During High-Temperature Deformation
F. H. Hammad, W. D. Nix 94

Carbide Formation from Beta-Titanium and Graphite
Carl A. Vansant, W. C. Phelps, Jr. 105
Discussion 1061

Elevated-Temperature Magnetic Properties of High-Strength Steels
C. R. Honeycutt, E. A. Steigerwald 113

Prior Austenite Grain Boundary Delineation in Alloy Tool Steels (TN)*
B. R. Banerjee, J. J. Hauser 128

Fabrication of an Ultra-Fine Cb – Cu Composite by Drawing (TN)
H. E. Cline, B. P. Strauss, R. M. Rose, J. Wulff 132

Discussions to Application of a Modified Two-Load Method for the Determination of Low-Temperature True Stress-Strain Properties of Several Commercial Titanium and Maraging Steel Alloys (Vol. 57, 1964, p. 823) 137

Superplasticity of Steels During the Ferrite⇌Austenite Transformation
Dietrich Oelschlägel, Volker Weiss 143

Deformation Structures in Polycrystalline Ni_3Al
B. H. Kear, M. F. Hornbecker .. 155

Primary Solidification and Spiking in White Cast Iron
R. W. Heine, R. J. Warshal 162

The Effects of Temperature and Strain Rate on the Yield and Flow Stresses of α-Titanium
R. N. Orava, G. Stone, H. Conrad 171

Current-Carrying Capacity of Superconducting Cb_3Sn Layers Produced by an Interdiffusion Heat Treatment
R. Silverman, L. S. Castleman, C. F. Tufts 185

Low-Cycle Fatigue-Crack Propagation and Fractographic Investigation of Ti – 7 Al – 2Cb – 1Ta and Ti – 6Al – 4V in Air and in Aqueous Environments
R. W. Judy, Jr., T. W. Crooker, R. E. Morey, E. A. Lange, R. J. Goode 195

* The notation TN appearing in parentheses designates a Technical Note.

Observations on the Hardness, Lattice Parameter and Microstructure of Internally Oxidized Silver Magnesium and Silver Aluminum Alloys
J. S. Hirschhorn, F. V. Lenel.. 208
Effects of Strain Rate, Temperature, and Composition on Tensile Properties of Metastable Austenitic Stainless Steels
J. P. Bressanelli, A. Moskowitz 223
Relative Interfacial Energies for the Solid Copper–Liquid Bismuth–Thallium System
Bernard J. Rogus..... 240
Development of a Wrought High-Strength Magnesium–Yttrium Alloy
R. V. London, R. E. Edelman, H. Markus..... 250
Investigation of Transformation and Precipitation in 15% Ni Maraging Steel
K. Detert..... 262
An Evaluation of the Creep Properties of Cb–753 and a Comparison of This Alloy with Several Other Niobium–Base Alloys
H. E. McCoy..... 277
Structures and Strengthening Mechanisms in Carbon Steel Wire
V. K. Chandhok, A. Kasak, J. P. Hirth..... 288
Anisotropy and Its Relationship to Deep Drawing of a 5% Cr Tool Steel (H-11)
R. M. Colton, J. D. Colgate... 302
Direct Observation of the Liquid Metal Embrittlement of Aluminum by Gallium
W. R. Goggin, J. W. Moberly.. 315
A Study of the Vaporization and Creep-Rupture Behavior of Type 316 Stainless Steel
D. T. Bourgette, H. E. McCoy. 324
Intermetallic Precipitation in Austenitic Steels Containing Niobium and/or Tantalum (TN)
R. T. Weiner, J. J. Irani..... 340
Parting Plane Effects on Fracture Mode and Toughness in a 7079-T6 Die Forging (TN)
Michael V. Hyatt, Harold R. Zahn, J. Corey McMillan..... 342
Preparation of Thin-Film Specimens of Refractory Metals for Transmission Electron Microscopy (TN)
W. D. Hepfer..... 345
Effect of Cold Work on Room-Temperature Tensile Properties of TiNi Intermetallic Compound (TN)
A. G. Rozner, W. J. Buehler... 350
Partial Constitutional Diagrams for the Cd–La, Cd–Ce, Cd–Pr, Cd–Nd, and Cd–Sm Systems (TN)
Irving Johnson, Karl E. Anderson, Robert A. Blomquist..... 352
Discussion to a Structural Basis for Superplasticity (Vol. 58, 1965, p. 551)..... 356
Correction to Vol. 58, p. 664 360
Faulting in Cold Worked Ta–10% Re and W–20% Re
E. N. Aqua, C. N. J. Wagner.. 367
Calculation of Cleavage Characteristics of Hexagonal-Close-Packed Crystals
M. H. Richman..... 374
The Effects of Oxygen on the Mechanical and Corrosion Properties of Hafnium
J. G. Goodwin, H. E. Trout, Jr..... 384
Creep Ductility and Dimensional Instability of Nickel at 500 and 525 C
D. A. Woodford..... 398
Discussion..... 1061
The Effect of Nitrogen on the Tensile and Creep-Rupture Properties of Niobium
J. Stoop, P. Shahinian..... 411

The Two-Stage Precipitation of Carbon From Ferrite
M. G. H. Wells, J. F. Butler . . 427
A Study of the Toughness Differences Between Aluminum-Killed and Semikilled Steels
W. Jolley, E. H. Kottcamp 439
Prevention of Molybdenum Alloy Ingot Cracking by Capping
W. H. Chang 457
A Study of Precipitation in Stainless and Maraging Steels Using the Mössbauer Effect
Harris Marcus, Lyle H. Schwartz, Morris E. Fine . . . 468
On Grain Boundary Self-Diffusion of Lead: Part I — Orientation Dependence
J. P. Stark, W. R. Upthegrove . 479
On Grain Boundary Self-Diffusion of Lead: Part II — Effect of Solutes
J. P. Stark, W. R. Upthegrove . 486
Dislocation Substructure in Iron Induced by Alpha-Gamma-Alpha Transformation Cycling
L. Zwell, L. A. Gorman, S. Weissmann 491
Discussion 1065
Phase Reactions in B-1900 Nickel-Base Alloy from 1600 to 1800 F
W. P. Danesi, M. J. Donachie, J. F. Radavich 505
Discussion 1067
Diffusion Calculations in Three-Component Solid Solutions
A. G. Guy, V. Leroy, T. B. Lindemer 517
The Activity of Oxygen in the Liquid Fe–Pt Alloy System
E. S. Tankins, W. A. Sipes 535
Heat Treatment and Corrosion Resistance of Austenitic Type 304 Stainless Steel
K. T. Aust, J. S. Armijo, J. H. Westbrook 544
Multiprocess Creep in Uranium Deduced from Literature Data
J. J. Holmes 557
The Influence of Neutron Irradiation on Twinning in a Niobium–Vanadium Alloy (40% V) (TN)
H. E. McCoy, D. O. Hobson . . 568
Metal Science Forums Abstracts
New Insights into Strengthening 572
Stress-Corrosion 581
Discussion to Effects of Experimental Rolling During Continuous Cooling Through the Critical Temperature Range on Mechanical Properties of Low Carbon, Low Alloy Steels (Vol. 58, 1965, p. 489) 588
Correction to Vol. 59, p. 296 . 591
Correction to Vol. 59, p. 314 . . . 591
Campbell Memorial Lecture: Monocrystals in Mechanical Technology
John J. Gilman 596
Effect of Dissolved Hydrogen on the Fatigue Behavior of an Al–Al_2O_3 SAP-Type Alloy
G. S. Ansell, H. S. Kim, H. C. Rogers 630
Epitaxy of Tin Electrodeposited on Iron
S. A. Bradford 644
The Dependence of Elastic and Magnetic Properties of Nickel–Copper Alloys on Annealing Temperature
K. Numakura, H. Yamamoto, S. Weissmann 652
The Effect of Grain Boundary Penetration on the Delayed Failure of Cu–2% Be
J. V. Rinnovatore, J. D. Corrie, H. Markus 665
Grain Boundary Effects in Oxide Dispersion - Strengthened Zinc
D. Tromans, J. A. Lund 672

Improved Efficiency in Wiredrawing with Ultrasound
D. Oelschlägel, B. Weiss 685
Relationship of Microstructure to Some Mechanical Properties of Ti-8Al-1V-1Mo
M. J. Blackburn 694
Dislocation Substructure and Extension of Fatigue Life in Metal Crystals
S. Weissmann, A. Shrier, V. Greenhut 709
Creep and Tensile Properties of Heavily Drawn Tungsten Wire
B. Harris, E. G. Ellison 744
Superplasticity in the Al-Cu Eutectic Alloy
David L. Holt, Walter A. Backofen 755
An Investigation of the Fatigue Behavior of 18% Nickel Maraging Steel
G. W. Tuffnell, D. L. Pasquine, J. H. Olson 769
Athermal Stabilization of Austenite
H. R. Woehrle, W. R. Clough, G. S. Ansell 784
Recrystallization and Grain Structure in Rimmed and Aluminum-Killed Low-Carbon Steel
R. H. Goodenow 804
The Effect of Grain Size on the Stress-Strain Relationship in Low-Carbon Steel
W. B. Morrison 824
The Effects of Load and Temperature Cycling on the Creep Behavior of a Nickel-Base Alloy
G. A. Webster, B. J. Piearcey .. 847
Oxide Dispersion-Strengthened NiAl and FeAl
A. U. Seybolt 860
Phase Transformations in the Alloy Ti-8Al-1Mo-1V
M. J. Blackburn 876
The High-Temperature Steady-State Creep of Pure Silver and Internally Oxidized Silver-Magnesium Alloys
G. R. Leverant, F. V. Lenel, G. S. Ansell 890
A Discussion of Slow Crack Growth Associated with Plane-Strain Instability
W. W. Gerberich 899
Experimental Determination of Plastic Constraint Ahead of a Sharp Crack Under Plane-Strain Conditions
G. T. Hahn, A. R. Rosenfield .. 909
Brittle Fracture in Alpha-Titanium
M. F. Amateau, H. I. Burrier, Jr., L. J. Ebert 920
Elevated-Temperature Deformation Mechanisms in β'-NiAl
R. R. Vandervoort, A. K. Mukherjee, J. E. Dorn 930
A Quantitative Approach to Casting Solidification: Freezing of Cast Iron
W. Oldfield 945
Numerical Descriptions of the Ambient, Low-Temperature, and High-Strain-Rate Flow and Fracture Behavior of Plain Carbon Steel
A. R. Rosenfield, G. T. Hahn .. 962
Analysis of Plane-Strain Fracture in a Series of 0.45C-Ni-Cr-Mo Steels with Different Sulfur Contents
A. J. Birkle, R. P. Wei, G. E. Pellissier 981
An Etching Technique to Reveal Strain in High-Strength Steel (TN)
W. R. Warke, J. L. McCall 991
Electrical Resistivity and Conductivity of Tungsten-Fiber-Reinforced Copper Composites (TN)
D. L. McDanels 994
Stress in a Mild Steel Surface Impregnated with Nitrogen (TN)
H. A. Wriedt, L. Zwell, W. C. Leslie, J. H. Scott, P. A. Stoll .. 998

Some Microstructural Observations on the Deformation and Fracture Characteristics of a Nickel-Base Alloy in Static Creep (TN)
C. P. Sullivan, E. G. Ellison... 1002
The Effect of Precipitation of $MnAl_6$ Upon the Recrystallization Characteristics of Aluminum-Manganese Alloys (TN)
J. G. Morris... 1006
Dilatometric and Resistometric Studies of White Cast Iron at Subcritical Temperatures (TN)
S. Banerjee, Carl R. Loper, Jr.. 1010
Officers and Trustees... 1015
Medalists, Awards and Life Members... 1016
Standing Committees... 1021
Chapters and Officers... 1029
Technical Program at 48th Annual Convention... 1036
Awards Luncheon... 1038
Report of the Foundation for Education and Research
John A. Fellows... 1040
President's Report
Stewart G. Fletcher... 1042
Secretary's Report
Carl H. Samans... 1045
Treasurer's Report
William D. Manly... 1046
Managing Director's Report
Allan Ray Putnam... 1052
Election of Officers... 1055
Annual Dinner... 1056
Discussion to the Effects of a Manganese–Oxygen Interaction on the Recrystallization of Iron (Vol. 58, 1965, p. 672).. 1057
Correction to Vol. 59, p. 375... 1069
Correction to Vol. 59, p. 575... 1069
Index to Volume 59... 1071